ASRP RCRA TANK ASSESSMENT PLAN

INDEPENDENT RCRA CERTIFICATION OF THE ACCELERATED SLUDGE REMOVAL PROJECT HAZARDOUS WASTE STORAGE TANK SYSTEM

EG&G Subcontract # MTS 350370PA3

December 15, 1993

Prepared for:

EG&G Rocky Flats, Inc.
Environmental Restoration Management
Solar Ponds Project Office
Building 80
P.O. Box 464
Golden, CO 80402-0464

Prepared by:

ERM-Rocky Mountain, Inc.
5950 South Willow Drive, Suite 200
Greenwood Village, Colorado 80111

ERM-Rocky Mountain Project No. R31206.0

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1.0 INTRODUCTION

The purpose and objective of the Rocky Flats Accelerated Sludge Removal Project (ASRP) is to expeditiously remove approximately 900,000 gallons of waste materials from the 788 Clarifier and the 207 B South and C Ponds. These waste materials will be transferred via tank trucks to a series of new polyethylene tanks, which will be located inside Tents 3, 4 and 6 on the 750 Pad. Approximately 72 tanks will be purchased from Poly Cal Plastics of French Camp, California.

The Department of Energy (DOE) is required to remove the waste materials from the 788 Clarifier and the 207 B and C Ponds by January 20, 1995. EG&G has developed more aggressive internal goals for completing the transfer of these waste materials. EG&G has scheduled to remove the waste materials from the 207 B South Pond by December 31, 1993 and from the 207 C Pond by March 31, 1994.

DOE is requesting that the Colorado Department of Health (CDH) grant interim status to the polyethylene tanks that will be used for storage on the 750 Pad. DOE will later request a modification of the Rocky Flats Plant Part B permit to include these tanks. The tanks are currently subject to the requirements of Part 265, Subpart J of the Colorado Hazardous Waste Regulations, 6 CCR 1007-3. Section 265.192 requires that owners or operators of new tank systems obtain and submit to CDH a written assessment, reviewed and certified by an independent, qualified registered professional engineer, in accordance with Section 100.12(d) attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste.

The assessments of the new polyethylene tanks for storage of the waste materials from the 788 Clarifier and the 207 B South and C Ponds will be performed by ERM-Rocky Mountain (ERM). This document describes the plan that ERM will implement to complete these tank assessments. Section 1.0 provides background information on the ASRP, as well as an explanation of the driving forces behind the requirement for tank assessments. Section 2.0 details the scope of EG&G's and ERM's responsibilities for

completing the project. Section 3.0 describes the methodology that ERM will use to perform the tank assessments, and includes separate discussions of the vendor site visit, the review of the engineering design package and waste characterization data, shipping/delivery/installation oversight, and the preparation of the written certifications. Section 4.0 presents the proposed project schedule, along with a list of the key assumptions used in developing the schedule. Finally, Section 5.0 details the quality assurance/quality control procedures ERM will use during the completion of the tank assessments.

2.0 CERTIFICATION SCOPE

ERM has been contracted to prepare a written assessment of the polyethylene tanks to be used for storage of waste materials from the 788 Clarifier and the 207 B South and C Ponds. A qualified, Colorado registered professional engineer with ERM will review and certify the assessment in accordance with Section 100.12(d) of 6 CCR 1007-3, attesting that each tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste as required under Section 265.192 of 6 CCR 1007-3.

ERM will assess the following items prior to preparing the certification:

- Design standards used to construct the tanks and ancillary equipment (265.192(a)(1)).
- Hazardous characteristics of the wastes to be handled (265.192(a)(2)).
- Design considerations used to ensure that tank foundations will maintain the load of a full tank (265.192(a)(5)(i)).
- Design considerations used to ensure that tank systems will be anchored or spaced to prevent dislodgement where the tank system is placed in a seismic fault zone (265.192(a)(5)(ii)).
- Design considerations used to ensure that tank systems will withstand the effects of frost heave (265.192(a)(5)(iii)).

- Handling procedures used to prevent tank damage during installation (265.192(b)).

- Tank system integrity after installation through an inspection for weld breaks, punctures, scrapes of protective coatings, cracks, corrosion and other structural damage or inadequate construction or installation (265.192(b)(1-6)).

- Tightness of tanks and ancillary equipment prior to use (265.192(d)).

- Measures used to protect the ancillary equipment from physical damage and excessive stress due to settlement, vibration, expansion or contraction (265.192(e)).

The scope of work for the ASRP tank assessments does not include:

- Assessment of repairs performed on damaged tank vessels, if necessary, prior to enclosure or use of tank systems.

- Review of inspection procedures, operating procedures, or contingency/emergency response procedures.

- Review of tank closure plans.

- Review of training plans.

In order to complete the tank assessments and the certification documentation, ERM will need EG&G to provide the following information:

- Complete design package for the ASRP tank systems.

- Supporting calculations for the design package.

- Plan and elevation views of the ASRP tank systems with dimensions.

- Vendor supplied information, including test data and material specifications.

3.0 METHODOLOGY

ERM will use a phased approach in performing the assessments on the ASRP polyethylene tanks. ERM will first conduct a site visit to the Poly Cal Plastic facility in French Camp, California to verify tank manufacturing, testing and packaging procedures, and to obtain additional tank data. Concurrently, ERM will begin reviewing existing information, including the ASRP design criteria and the available waste characterization data. As tanks are received by EG&G at the Rocky Flats Plant, ERM will oversee EG&G's receipt inspections to check for damage to the tanks and to ensure that the proper shipping requirements have been met. During the construction phase of the ASRP, ERM will be present to observe the installation and testing of the tanks.

After the necessary conditions have been met, ERM will prepare written certifications for each tank or group of tanks, in accordance with 6 CCR 1007-3, Section 265.192, using a two-tiered approach. ERM will first complete an initial certification of structural integrity for each tank vessel, to allow EG&G to place each individual tank in service in a timely manner. ERM will then prepare a final certification for all the tank systems and their ancillary equipment. ERM anticipates providing the initial certifications in multiple groups, with a certification package submitted for each group of tanks installed during a given week. Following the completion of the project, ERM will provide a final report, which will include all of the tank assessments.

For each phase of the assessment process: the vendor site visit; the existing information review; and the shipping/delivery/installation oversight, ERM has established general screening level criteria. These criteria will enable ERM to quickly determine if the substantive requirements of each portion of the assessment process have been met. The criteria are posed in question form and appear in the text portions of their respective subsections. A "No" response to any of the questions will indicate a significant concern, which ERM will communicate to EG&G immediately. For the "Yes" responses, ERM will use an assessment checklist to investigate the specific requirements associated with the general screening level criteria. For example, as part of the vendor site visit, ERM

will verify that hydrostatic testing of the ASRP tanks has been properly completed. If, during the visit, ERM discovered that the testing had not been performed, there would be an immediate and serious concern. If, instead, the testing had been completed, ERM would use the vendor site visit checklist to verify that the testing was conducted in accordance with the appropriate specifications. The checklists for each criteria are referenced in the applicable subsection and are included in Appendices A, B and C.

To complete the ASRP tank assessments, ERM will use a project team consisting of six engineers. The majority of the field work and engineering calculation checks will be performed by four individuals with the additional two engineers providing support during peak work periods. Two individuals will be sent to California to conduct the vendor site visit. Two teams, each consisting of two engineers, will review the existing information. One team will concentrate on the assessment of structural integrity. This assessment will include a review of tank system design standards, tank thickness and stress calculations, seismic evaluations, performance test results, and overfill, leak detection, secondary containment and spill control designs. The second team will focus on evaluating the compatibility of the tanks with the wastes to be stored. This evaluation will include a review of corrosion calculations, material specifications and chemical-resistance data, waste characteristics and physical properties, and performance test results. The shipping/delivery/installation oversight will be performed by ERM engineers. At a minimum, one Colorado registered professional engineer will be present on-site to conduct the installation portion of the oversight effort. The following subsections describe the specific procedures that ERM will follow to complete the tank assessments.

3.1 Vendor Site Visit

Two engineers from ERM will visit the Poly Cal Plastics manufacturing facility in French Camp, California on December 2-3, 1993. The primary objective of the visit is to determine if Poly Cal Plastics manufactures, tests and packages the ASRP tanks in accordance with the requirements specified in ASTM D 1998-91, "Standard Specification for Polyethylene Upright Storage Tanks", the design basis selected by EG&G. The

following general screening level criteria will be used to determine if the vendor has met the substantive requirements associated with the manufacture, test and packaging of the ASRP tanks:

1. Are the ASRP tanks being manufactured in accordance with the requirements of ASTM D 1998-91?

2. Does the manufacturer have the capability to perform the Low-Temperature Impact Test for the ASRP tanks?

3. Does the manufacturer have the capability to perform the O-Xylene-Insoluble Fraction (Gel) Test for the ASRP tanks?

4. Does the manufacturer have procedures to visually inspect the ASRP tanks?

5. Does the manufacturer have the capability to perform hydrostatic testing for the ASRP tanks.

If a "No" response is recorded for any of these five questions, ERM will notify EG&G immediately. For the "Yes" responses, ERM will use the Vendor Site Visit Checklist, which is included as Appendix A, to investigate the specific requirements associated with the vendor site visit screening criteria. In addition to verifying compliance with the requirements of ASTM D 1998-91, ERM will also request the following information from Poly Cal Plastics:

- Chemical-resistance charts for the polyethylene material used in the tank fabrication.
- Hydrostatic-hoop-stress data for the polyethylene resin used in the tanks.
- QA/QC records and procedures for the tank manufacturing, testing and packaging processes.

3.2 *Information Review*

Review of existing information will involve an evaluation of the design basis, the design criteria embodied in the Tank Procurement Specification (P-Spec) and the Consolidated Bill of Materials (CBOM), and the available waste characterization data. ERM will use the technical requirements specified in the design standards (e.g. ASTM D 1998-91) and in the Colorado Hazardous Waste Regulations to determine the necessary technical elements for the ASRP tank design. ERM will then check the existing engineering data and calculations for accuracy and completeness. ERM will also identify if any required technical information is not included in the design package.

3.2.1 *Design Information Review*

The review of the existing design information will include the tank design criteria as embodied in the tank procurement documents (i.e. the P-Spec and CBOM) and other relevant technical data such as the ASRP seismic evaluation. The engineering work plan and associated design modification packages will also be reviewed. These reviews will be conducted in order to verify the adequacy of the engineering design as it relates to the demonstration that the ASRP tank systems have sufficient structural integrity and are acceptable for the storing and treating of hazardous waste. The following general screening level criteria will be used to determine if EG&G has met the substantive requirements associated with the design of the ASRP tanks:

1. Are the ASRP tanks designed in accordance with the requirements of ASTM D 1998-91?

2. Are the ASRP tanks designed in accordance with the requirements of Part 265 Subpart J of the Colorado Hazardous Waste Regulations?

3. Are the ASRP tanks designed to meet the criteria specified in the tank procurement documents?

4. Are the ASRP tank ancillary systems (e.g. vents and leak detectors) designed in accordance with their applicable design standards?

5. Are the tank foundations designed to properly support the filled ASRP tanks?

If a "No" response is recorded for any of these five questions, ERM will notify EG&G. For the "Yes" responses, ERM will use the Information Review Checklist, which is included as Appendix B, to investigate the specific requirements associated with the design information screening criteria.

3.2.2 Waste Characterization Data Review

The waste characterization data review will include the available analytical data for the waste materials from the 788 Clarifier and the 207 B and C Ponds, chemical-resistance data for the polyethylene material and the ASRP tank corrosion report. These reviews will be conducted in order to verify that the ASRP tank systems are compatible with the waste materials to be stored in them. The following general screening level criteria will be used to determine if EG&G has met the substantive requirements associated with the waste compatibility of the ASRP tanks:

1. Does the available analytical data provide sufficient information to determine the physical and chemical characteristics of the ASRP waste materials?

2. Were the ASRP tanks designed to resist the corrosion properties of the wastes to be stored in them?

3. Were the ASRP tanks designed to be compatible with the physical properties of the wastes to be stored in them?

If a "No" response is recorded for any of these three questions, ERM will notify EG&G. For the "Yes" responses, ERM will use the Information Review Checklist, which is included as Appendix B, to investigate the specific requirements associated with the waste characterization design information screening criteria.

3.3 *Shipping/Delivery/Installation Oversight*

ERM will oversee EG&G's tank receiving inspections and review EG&G's quality inspection documentation. During installation of the tanks ERM will focus on tank integrity and installation requirements. The following are general questions that will provide a basic screening level criteria for the work performed during the shipment, delivery and installation of the tanks:

1. Were all manufacturer-specified requirements for shipping followed?
2. Were all manufacturer and EG&G instructions for off-loading followed?
3. Was the tank foundation constructed in accordance with proper design considerations?
4. Were proper handling procedures followed to prevent tank damage during installation?
5. Are fill nozzles, vents, leak detectors and other ancillary equipment installed in accordance with design specifications?
6. Do the vents comply with OSHA standards for normal venting for aboveground tanks, or another accepted standard?

If a "No" response is recorded for any of the above questions, ERM will notify EG&G. For the "Yes" responses ERM will use the Shipping/Delivery/Installation Checklist, included as Appendix C, to assist in the detailed oversight inspection of shipping, delivery and installation procedures.

3.4 *Certifications*

If results from the Vendor Site Visit, Information Review and Shipping/Delivery/Installation Oversight, are in accordance with Section 100.12(d) of 6 CCR 1007-3, and attest that each tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste as required under Section 265.192 of 6 CCR 1007-3; a qualified, Colorado registered professional engineer with

ERM will prepare the tank certifications. The evaluation of each tank system includes an initial certification which covers design, manufacturing, shipping and installation of the primary and secondary tanks, and a final certification package which includes an evaluation of the ancillary equipment. The initial tank system certification is provided in Appendix D.

4.0 SCHEDULE

A schedule was developed for this project to establish milestones and monitor progress. A Gantt chart can be found in Figure 4-1. The project has been divided into three major events consisting of construction inspections, initial tank certifications, and complete tank certifications. These events are described in the following paragraphs.

Construction inspection will consist of on-site observations beginning on or before December 13, 1993. Qualified personnel will be inspecting equipment before and after installation to ensure its integrity. The inspectors will utilize the checklist located in Appendix C as a comprehensive guide to perform the equipment evaluations. These inspections are expected to be concluded on or before February 9, 1994.

During this period of inspections, the initial certifications will be completed in multiple packages. The tanks will be divided into groups based on the number of tanks installed each week. Each of these tanks will undergo a thorough inspection and will receive an initial certification. Each certification package will be submitted to EG&G within eight days of the installation of the final tank for a given week. Initial certification of the ASRP tanks is expected to be complete by February 16, 1994.

The next major event will be the preparation of complete tank certifications for all tanks. This task will be completed after construction of all ancillary equipment and consists of six stages. They include draft preparation, submittal, EG&G review, an informational meeting, final preparation, and final submittal. These items are expected to take

approximately one month to complete beginning on February 10, 1994 and ending on March 15, 1994.

The schedule shown in Figure 4-1 is based on the following assumptions. Changes in one or more of these assumptions may result in schedule delays.

- EG&G will begin receiving tanks by December 13, 1993.
- Tanks will arrive and undergo installation at a rate no slower than ten tanks per week.
- All tanks will be installed by February 4, 1993.
- Installation of all ancillary equipment will be complete by February 18, 1993.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

Work performed by ERM will be governed by the EG&G Rocky Flats, Inc. Environmental Restoration (ER) Quality Assurance Project Plan (QAPjP). An organizational chart describing the positions, responsibilities, and assigned personnel for this project is shown in Figure 5-1. It is expected that technical liaison will occur directly between various ERM staff members and EG&G personnel. The ERM Program Manager is the only individual with the authority to approve change orders or technical variances that affect contract scope, budget or schedule. Likewise, the EG&G Contract Technical Representative is the exclusive official authority for technical direction for ERM.

Prior to beginning work, personnel performing technical work shall receive approximately eight hours of training and indoctrination in applicable procedures in accordance with 3-21000-ADM-2.02, to ensure proper understanding of the quality assurance and technical requirements described in the RCRA Tank Assessment Plan. Project personnel will attend EG&G Rocky Flats training for Quality Assurance and technical procedures. All project personnel are responsible for reading, understanding and implementing the requirements contained in the QAPjP. In addition, all personnel

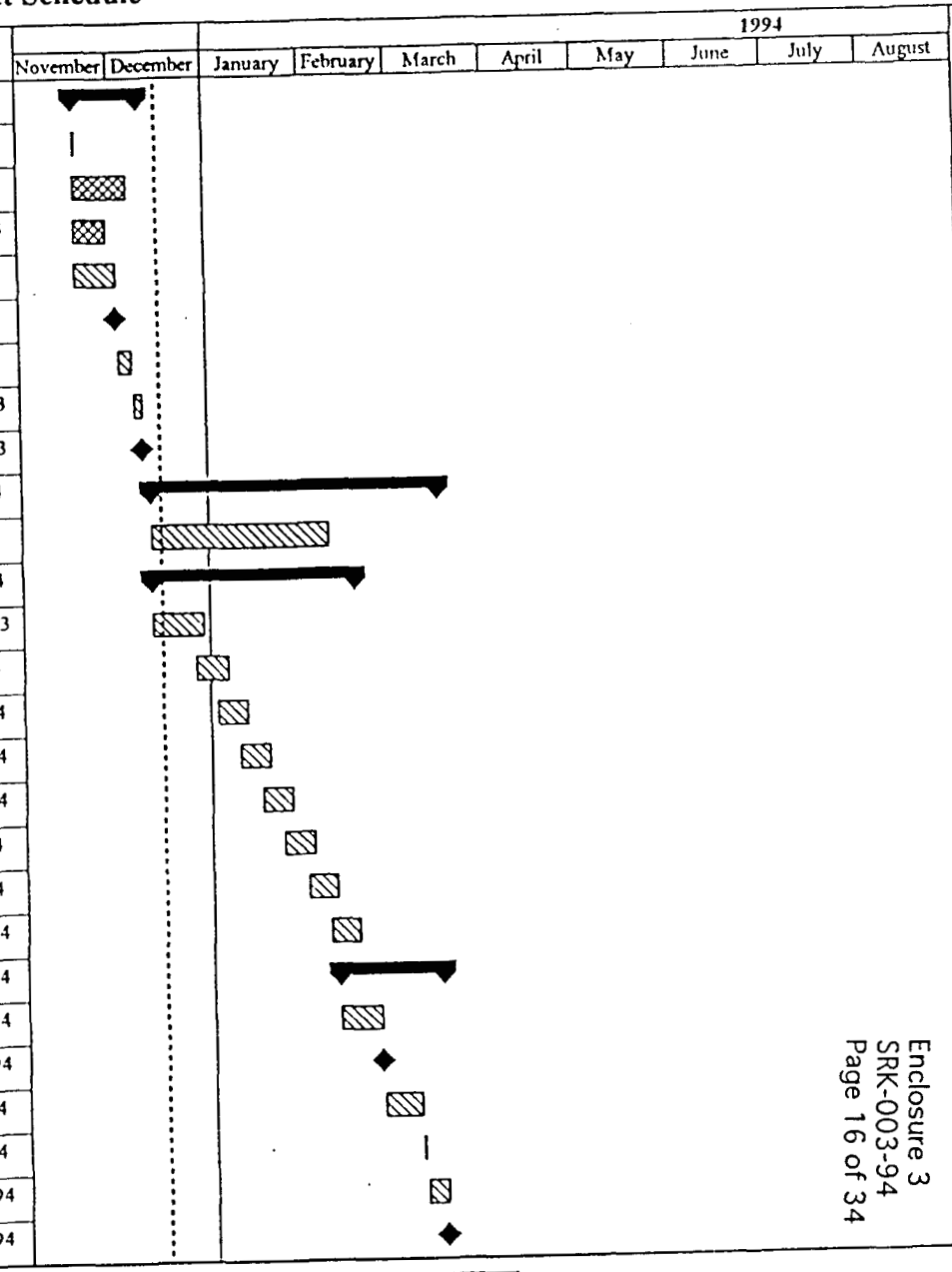
are responsible for reading, understanding and implementing the procedures described within this Plan. All personnel performing work in controlled areas are required to have appropriate 40-hour OSHA health and safety training and any additional training as specified in the EG&G Health and Safety Practices manual and the Rocky Flats Plant Environmental Restoration Health and Safety Program Plan. Training requirements will be established for all project personnel and will be documented in the project file.

Included in the certification procedures, project personnel will prepare and verify all calculations following ERM internal procedures for calculation briefs. In addition, text and tables will be prepared and checkprinted by project personnel to ensure consistency and technical accuracy. Project personnel will review the completed checklists in Appendices A, B, and C for consistency and completeness. The tank system will be certified by an independent, qualified, Colorado registered professional engineer from ERM. The certification will be prepared in accordance with Colorado Hazardous Waste Regulations, 6 CCR 1007-3, Section 265.192.

FIGURE 4-1
ASRP RCRA TANK ASSESSMENT PROJECT SCHEDULE

ASRP Tank Certification
Project Schedule

ID	WBS	Activity	Days	Start	Finish
1	1	Task 1 - Preparation of Tank Certification Plan	14d	11/19/93	12/10/93
2	1.1	Kick-off Meeting	1d	11/19/93	11/19/93
3	1.2	Personnel Training	10d	11/19/93	12/6/93
4	1.3	Review of Tank Drawings and Specifications	5d	11/19/93	11/29/93
5	1.4	Prepare Tank Certification Plan	8d	11/19/93	12/2/93
6	1.5	Submit Draft Tank Certification Plan	0d	12/2/93	12/2/93
7	1.6	EG&G Review of Draft Plan	3d	12/3/93	12/7/93
8	1.7	Incorporate EG&G Comments in Tank Cert. Plan	3d	12/8/93	12/10/93
9	1.8	Submit Final Tank Certification Plan	0d	12/10/93	12/10/93
10	2	Task 2 - Prepare Tank Certifications	65d	12/13/93	3/15/94
11	2.1	Conduct Inspections During Construction	40d	12/13/93	2/8/94
12	2.2	Prepare Initial Certifications	46d	12/13/93	2/16/94
13	2.2.1	Prepare First Package	12d	12/13/93	12/29/93
14	2.2.2	Prepare Second Package	8d	12/27/93	1/6/94
15	2.2.3	Prepare Third Package	8d	1/3/94	1/12/94
16	2.2.4	Prepare Fourth Package	8d	1/10/94	1/19/94
17	2.2.5	Prepare Fifth Package	8d	1/17/94	1/26/94
18	2.2.6	Prepare Sixth Package	8d	1/24/94	2/2/94
19	2.2.7	Prepare Seventh Package	8d	1/31/94	2/9/94
20	2.2.8	Prepare Eighth Package	8d	2/7/94	2/16/94
21	2.3	Prepare Complete Tank Certification	24d	2/10/94	3/15/94
22	2.3.1	Prepare Draft Complete Tank Certifications	10d	2/10/94	2/23/94
23	2.3.2	Submit Draft Complete Tank Certifications	0d	2/23/94	2/23/94
24	2.3.3	EG&G Review Draft Complete Tank Certificati	8d	2/24/94	3/7/94
25	2.3.4	Complete Draft Tank Certification Meeting	1d	3/8/94	3/8/94
26	2.3.5	Prepare Final Complete Tank Certifications	5d	3/9/94	3/15/94
27	2.3.6	Submit Final Complete Tank Certifications	0d	3/15/94	3/15/94

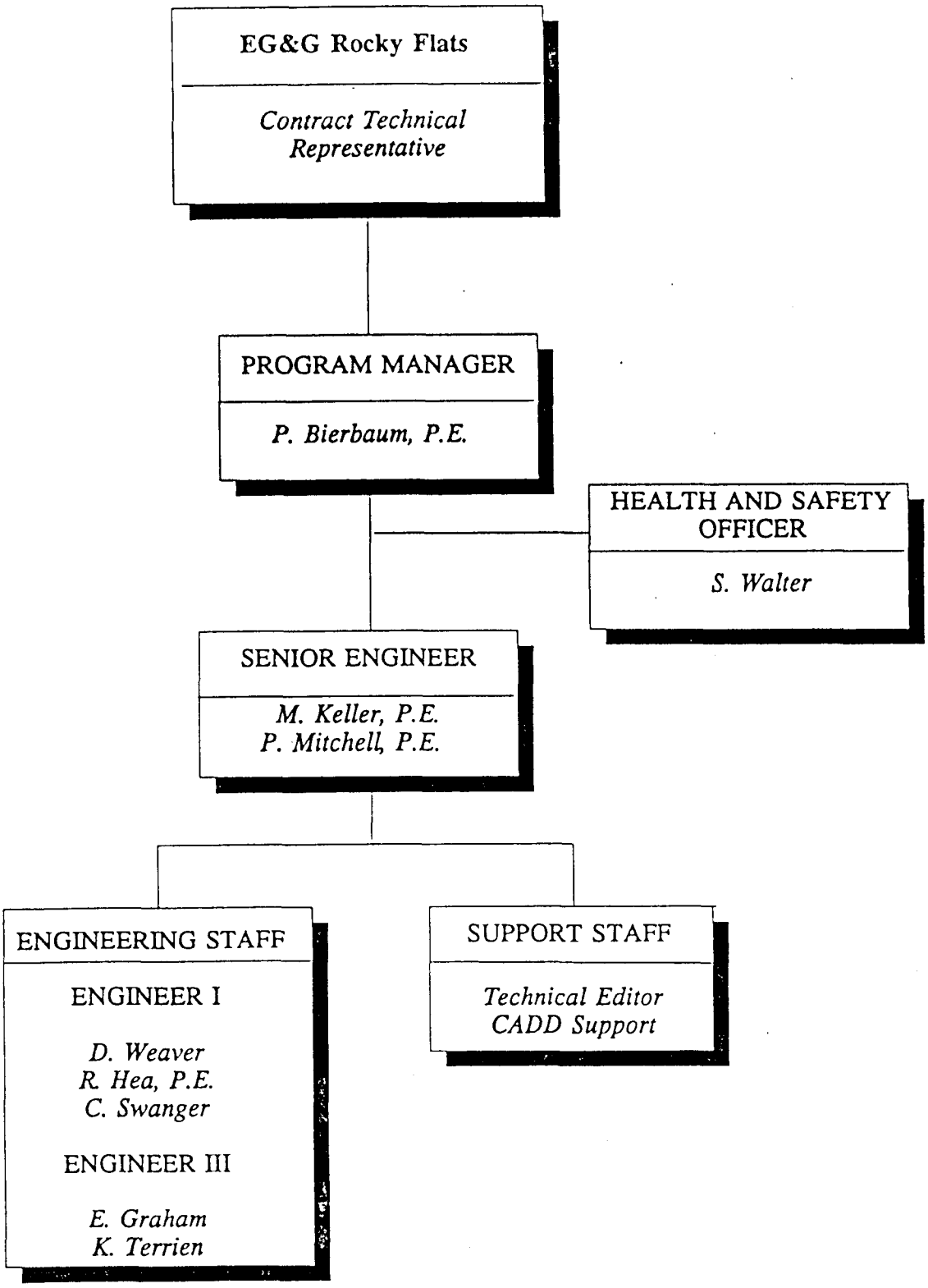


Project: ASRP Tank Certification
Date: 12/16/93
File: ASRPRV1.MPP

Critical
Noncritical
Progress
Milestone
Summary
Rolled Up

FIGURE 5-1
PROJECT ORGANIZATION

Figure 5-1
Project Organization



APPENDIX A
VENDOR SITE VISIT CHECKLIST

VENDOR SITE VISIT CHECKLIST

ASRP RCRA TANK ASSESSMENT
ROCKY FLATS PLANT
MTS 350370PA3

Inspector:_____
Date:_____
Location:_____

	Yes	No	N/A
1. Has the tank manufacturer demonstrated experience in the manufacturing of cross-linkable polyethylene tanks of similar size and service?	☐	☐	☐
2. Does the manufacturer have the capability to correlate all production and process parameters and all quality control information to a unique serial number stamped on the tank?	☐	☐	☐
3. Does the manufacturer supply handling procedures to the user for off-loading and placement to prevent tank damage?	☐	☐	☐
4. Are manufacturer's QC travelers supplied with each polyethylene tank (Tank information/test data for both primary and secondary tanks)?	☐	☐	☐
5. Is a "Certificate of Compliance" being submitted with each tank on manufacturer's letterhead stating the following?:	☐	☐	☐
a. Purchase Order number.	☐	☐	☐
b. Test performed and to which Standard or Procedure.	☐	☐	☐
c. Test results.	☐	☐	☐
6. Are the ASRP tanks molded from high density cross-linkable polyethylene (HDXLPE)?	☐	☐	☐
7. Are the ASRP tanks manufactured from virgin polyethylene material?	☐	☐	☐
8. Are the tanks manufactured by the rotational molding process outlined in ASTM D 1998-91?	☐	☐	☐
9. Do tanks contain an ultraviolet stabilizer?	☐	☐	☐
9a. If so, is the stabilizer present at a level adequate to give protection for the intended service life of the tank?	☐	☐	☐
9b. Is the stabilizer compounded in the polyethylene?	☐	☐	☐
10. Are pigments added to the polyethylene?	☐	☐	☐
10a. If so, are they compatible with the polyethylene, and do they not exceed 0.5% dry blended and 2% compounded in, or total weight?	☐	☐	☐
11. Is the top head integrally molded with the cylinder shell?	☐	☐	☐
11a. Is the minimum thickness of the top head equal to the thickness at the top of the straight wall?	☐	☐	☐

	Yes	No	N/A
12. Is the thickness for a full-supported flat-bottom head a minimum of 0.187 in.?	☐	☐	☐
12a. Is the radius of the bottom knuckle of a flat-bottom tank a minimum of 1.5 inches?	☐	☐	☐
12b. Is the minimum thickness of the radius greater than or equal to the maximum thickness of the cylinder wall?	☐	☐	☐
13. Is the top edge of the secondary tanks reinforced by design to maintain its shape after installation?	☐	☐	☐
14. Are all dimensions measured externally with an empty tank in the vertical position?	☐	☐	☐
15. Is the manufacturer checking and documenting tolerances?	☐	☐	☐
15a. Are these tolerances in accordance with ASTM D 1998-91?	☐	☐	☐
16. Are tank capacities based on total tank volume?	☐	☐	☐
17. Are the tanks visually inspected to ensure that the tank walls are free of visual defects such as foreign inclusions, air bubbles, pinholes, pimples, craters, cracks and delamination?	☐	☐	☐
18. Are the tanks permanently marked to identify the following?			
a. manufacturer	☐	☐	☐
b. date manufactured (month and year)	☐	☐	☐
c. capacity	☐	☐	☐
d. maximum specific gravity of tank design (1.9)	☐	☐	☐
e. serial number	☐	☐	☐
f. Type I	☐	☐	☐
19. Will confined space entry warning signs as prescribed by OSHA Standard 29 CFR 1910. 106 be affixed to the tanks?	☐	☐	☐
20. Are chemical-resistance charts available for the polyethylene material used in the tank fabrication?	☐	☐	☐
21. Will the manufacturer supply wall thickness readings along the straight wall and bottom of both the primary and secondary tanks?	☐	☐	☐
22. Will these readings be recorded on the shop traveler for submittal to the user?	☐	☐	☐
23. Do the shop drawings provided by the tank manufacturer have the necessary information to verify compliance with ASTM D 1998-91?	☐	☐	☐
24. Are test specimens taken from the man-way, fittings cut-out, or other representative areas?	☐	☐	☐
25. Does the manufacturer have a program to ensure calibration of all equipment prior to commencing fabrication and testing?	☐	☐	☐
26. Is hydrostatic-hoop-stress data available for the resin used in the tanks?	☐	☐	☐
27. Is stress-cracking resistance data available?	☐	☐	☐

	Yes	No	N/A
28. Is equipment available to perform impact tests in accordance with ASTM D 1998-91?	☐	☐	☐
28a. Are results from the low temperature impact test of Section 11.3 of ASTM D 1998-91 documented?	☐	☐	☐
29. Is equipment available to perform Gel Tests in accordance with ASTM D 1998-91?	☐	☐	☐
29a. Are results from the Gel Test of Section 11.4 of ASTM D 1998-91 documented?	☐	☐	☐
30. Is equipment available to perform hydrostatic tests on each tank?	☐	☐	☐
30a. Are the hydrostatic tests performed for a minimum of 30 minutes per tank and are the tanks checked for leakage?	☐	☐	☐
30b. Are results from the hydrostatic test documented?	☐	☐	☐
31. Are holes cut to be free of sharp corners?	☐	☐	☐
31a. Are holes cut to have a minimum clearance to ensure best fit?	☐	☐	☐
32. Are the size, location and specification for man-ways and fittings as agreed upon by RFP?	☐	☐	☐
33. Is one fill assembly provided per primary tank and located in the man-way?	☐	☐	☐
34. Are the fill assemblies being installed at the manufacturer's site?	☐	☐	☐
35. Do vents comply with OSHA 1910.106 (or other accepted standard) for normal venting for atmospheric tanks?	☐	☐	☐
35a. If not, are vents at least as large as the fitting or withdrawal connection, whichever is larger, but not less than 1.0 inch nominal inside diameter?	☐	☐	☐
36. Are fittings of appropriate strength to meet manufacturer and RFP specifications?	☐	☐	☐
37. Does manufacturer provide tanks with a means for overfill protection?	☐	☐	☐

Comments:_____

_____

_____

_____

_____

_____

APPENDIX B
INFORMATION REVIEW CHECKLIST

INFORMATION REVIEW CHECKLIST

ASRP RCRA TANK ASSESSMENT
ROCKY FLATS PLANT
MTS 350370PA3

Reviewer(s):_____
Date(s):_____

TANK DESIGN	Yes	No	N/A
1. Is the design height for the primary tank less than or equal to 12 feet?	☐	☐	☐
2. Is the design diameter for the secondary tank less than or equal to 14 feet?	☐	☐	☐
3. Are the secondary containment tanks designed to contain at least 100% capacity of the primary tank?	☐	☐	☐
4. Is the design volume for each of the primary tanks approximately 11,150 gallons?	☐	☐	☐
5. Is the design volume for each of the secondary tanks approximately 12,025 gallons?	☐	☐	☐
6. Do the polyethylene's stress-cracking resistance tests indicate a 50% failure point at a minimum of 500 hours in accordance with Test Method D 1693, Condition A, full-strength stress-cracking agent?	☐	☐	☐
7. Is the density of the tank polyethylene material within the acceptable design range?	☐	☐	☐
8. Is the ultimate tensile strength of the tank polyethylene material within the acceptable design range?	☐	☐	☐
9. Is the elongation at break of the tank polyethylene material within the acceptable design range?	☐	☐	☐
10. Is the vicat softening temperature of the tank polyethylene material within the acceptable design range?	☐	☐	☐
11. Is the brittleness temperature of the tank polyethylene material within the acceptable design range?	☐	☐	☐
12. Is the flexural modulus of the tank polyethylene material within the acceptable design range?	☐	☐	☐

	Yes	No	N/A
13. Was the formula in Section 6.1 of ASTM D 1998-91 used correctly to calculate the minimum required wall thickness of the cylindrical shell at any fluid level?	☐	☐	☐
13a. Have ±20% of the design thickness ranges been established for comparison with actual tank thicknesses?	☐	☐	☐
14. Was the hydrostatic-design-stress calculated correctly in accordance with Section 6.1.1 of ASTM D 1998-91?	☐	☐	☐
14a. Are the tanks designed with the appropriate design hoop stress value and an adequate safety factor, using the Barlow formula for calculating wall thickness in accordance with ASTM D 1998-91?	☐	☐	☐
14b. Was the tank hoop stress derated for service above 73.4°F and does the derated hoop stress exceed the hydrostatic-design-stress?	☐	☐	☐
15. Is the tank designed of sufficient structural strength, in accordance with ASTM D 1998-91 standards, to contain contents with a specific gravity of 1.9 using an appropriate safety factor?	☐	☐	☐
16. Are the seismic designs of the tanks in accordance with University of California Research Laboratory (UCRL)-15910 and RFP Standard SC-106 and are they specified for Important/Low Hazard usage category?	☐	☐	☐
17. Are the tank stresses due to static, hydrostatic, and hydrodynamic forces evaluated against the tank material allowable?	☐	☐	☐
18. Are all design calculations stamped by a Registered Professional Engineer?	☐	☐	☐
19. Is the manufacturer equipped to perform the Low Temperature Impact Test in accordance with Section 11.3 of ASTM D 1998-91?	☐	☐	☐
19a. Are test specimens cut from a manway, fitting, or other representative area?	☐	☐	☐
19b. Are specimens tested in a suitable apparatus with inside surface down and impacted with a dart of specified weight, height, and tip radius?	☐	☐	☐
19c. If the standard specimen size (5 in. by 5 in. or 127 mm by 127 mm) was not used, does supplier show correlation data between the actual size and the standard?	☐	☐	☐
19d. Does the test report include the following?:			
- Identification of the tank.	☐	☐	☐
- Date of test.	☐	☐	☐
- Foot-pounds used for test.	☐	☐	☐
- Pass or fail.	☐	☐	☐
19e. Have precision and bias been determined in accordance with Section 11.3.6.1 of ASTM D 1998-91?	☐	☐	☐

	Yes	No	N/A
20. Is the manufacturer equipped to perform the Gel Test in accordance with Section 11.4 of ASTM D 1998-91?	☐	☐	☐
20a. Are the test specimens taken from a manway, fitting, or other representative area which is normally removed from the tank before use?	☐	☐	☐
20b. Is the ASTM D 1998-91 test procedure in Section 11.4.7 and equation in Section 11.4.8 used?	☐	☐	☐
20c. Do test reports include the following?:			
- Identification of the tank.	☐	☐	☐
- Date of test.	☐	☐	☐
- Percentage of Gel calculated.	☐	☐	☐
- Precision and bias.	☐	☐	☐
20d. Is a 60% minimum gel level inside of the wall used to determine pass/fail?	☐	☐	☐
21. Is the manufacturer equipped to hydrostatically test tanks in accordance with Section 11.6 ASTM D 1998-91?	☐	☐	☐
21a. Are the tanks hydrostatically tested with the proper final fittings?	☐	☐	☐
21b. Do test reports include the following?:			
- identification of the tank	☐	☐	☐
- duration of the test	☐	☐	☐
- observance of leakage	☐	☐	☐
22. Are the size, location and specification for man-ways and fittings correct?	☐	☐	☐
23. Do calculations performed to determine vent size comply with OSHA 1910.106 (or other accepted standard) for normal venting of atmospheric tanks?	☐	☐	☐
23a. If not, are vents at least as large as the fitting or withdrawal connection, whichever is larger, but not less than 1.0 inch nominal inside diameter?	☐	☐	☐
24. Are plastic fittings designed in accordance with ASTM D 1998-91?	☐	☐	☐
25. Are plastic fittings made of Schedule 80, Type I, Grade I polyvinyl chloride (PVC) and pipe grade polyethylene?	☐	☐	☐
26. Are the tank fittings located in areas of extra thickness for added rigidity and structural integrity?	☐	☐	☐
27. Is the fill assembly designed to withstand hydrodynamic loadings and does it minimize the possibility of splashing on the underside of the closed tank top?	☐	☐	☐
28. Are all components contacting the tanks designed of compatible materials?	☐	☐	☐
29. Will PVC joints be solvent welded in accordance with ASTM D 2855?	☐	☐	☐
30. Are metal components designed to be A36 mild steel unless otherwise specified?	☐	☐	☐
31. Are gaskets designed to be Ethylene Propylene Diene Monomers (EPDM)?	☐	☐	☐

	Yes	No	N/A
32. Is a leak detection system designed?	☐	☐	☐
33. Are provisions made to ensure hydraulic communication between the primary tank bottom and the leak detection device(s) under fully loaded conditions?	☐	☐	☐
34. Is the sensor designed to be located at or near the bottom of the secondary tank so any leakage from the primary tank would be detected as early as practicable?	☐	☐	☐
35. Is the tank leak detection system self-contained, battery powered, and have a flashing light to signify a detected leak?	☐	☐	☐
36. Does the sensor have a low voltage battery indicator?	☐	☐	☐
37. Is the detection system capable of remaining in alarm mode (light flashing) for a minimum of 48 hours and is the alarm light enclosure rated NEMA 4X?	☐	☐	☐
38. Are the tents going to be heated?	☐	☐	☐
38a. If no, were the tanks designed to compensate for freeze and thaw?	☐	☐	☐

WASTE CHARACTERIZATION

1. Is all the appropriate and necessary characterization data of the chemicals and concentrations in the sludge and pond water available?	☐	☐	☐
1a. Is specific gravity defined?	☐	☐	☐
1b. Are the waste settling properties defined?	☐	☐	☐
1c. Is the chemical composition defined?	☐	☐	☐
1d. Are the radioactive properties of the waste defined?	☐	☐	☐
1e. Is the pH of the waste defined?	☐	☐	☐
2. Is the volume of waste from each of the solar ponds available?	☐	☐	☐
3. Has an assessment of the corrosion resistance of high density cross linked polyethylene (HDXLPE) to the solar pond water and sludge been performed?	☐	☐	☐
4. Has a determination been correctly made that the inorganic compounds present in the pond water or sludge are compatible with the HDXLPE material?	☐	☐	☐
5. Has a determination been correctly made that the organic compounds present in the pond water or sludge are compatible with the HDXLPE material?	☐	☐	☐
6. Were calculations correctly performed to determine the effect on the strength of the tank due to absorption of the active organic compounds?	☐	☐	☐
7. Were Total Organic Carbon (TOC) concentrations accounted for in determining the shell wall thickness of the tank?	☐	☐	☐

	Yes	No	N/A
8. Has a determination been correctly made that the radiological compounds present in the pond water or sludge are compatible with the HDXLPE material?	☐	☐	☐
9. Based on the waste characterization data and the chemical-resistance properties of the polyethylene material, are the ASRP tanks compatible with the wastes to be stored in them?	☐	☐	☐
10. Are the fabricated nozzles, gaskets, and other fitting accessories chemically compatible with the materials to be handled in the tanks?	☐	☐	☐
11. Are the bolts securing mechanical fittings manufactured of materials compatible with tank contents?	☐	☐	☐
12. Does the specific gravity used for the structural design meet or exceed the specific gravity of the waste?	☐	☐	☐

Comments:_____

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APPENDIX C
SHIPPING/DELIVERY/INSTALLATION OVERSIGHT CHECKLIST

SHIPPING/DELIVERY/INSTALLATION OVERSIGHT FORM

ASRP RCRA TANK ASSESSMENT
ROCKY FLATS PLANT
MTS 350370PA3

Inspector:_____
Date:_____

RCRA No._____
RFP Tank No._____
Primary Tank Serial No._____
Secondary Tank Serial No._____
Tent No._____

	Yes	No	N/A
1. Were manufacturer's instructions for off-loading, and placement provided prior to shipment?	☐	☐	☐
2. Were manufacturer's QC travelers supplied with each polyethylene tank (Tank information/test data for both the primary and secondary tanks)?	☐	☐	☐
3. Were all manufacturer-specified requirements for shipping followed?	☐	☐	☐
a. Was the primary tank nested inside the secondary tank for shipment?	☐	☐	☐
b. Were the tanks covered to prevent debris contamination?	☐	☐	☐
c. Were tanks positively vented during transport?	☐	☐	☐
d. Were all fittings and flange faces protected from damage during transport?	☐	☐	☐
e. Were loose items protectively packed separately and not left inside tanks where damage to tank may have resulted?	☐	☐	☐
4. Were manufacturer's instructions for off-loading followed?	☐	☐	☐
a. Was offloading completed without mishap?	☐	☐	☐
5. Are the primary tanks permanently marked with the following?			
a. manufacturer	☐	☐	☐
b. date manufactured (month and year)	☐	☐	☐
c. capacity	☐	☐	☐
d. maximum specific gravity of tank design	☐	☐	☐
e. serial number	☐	☐	☐
f. Type I	☐	☐	☐
g. confined space entry marking	☐	☐	☐
6. Are the secondary tanks permanently marked with the following?			
a. manufacturer	☐	☐	☐
b. date manufactured (month and year)	☐	☐	☐
c. capacity	☐	☐	☐
d. maximum specific gravity of tank design	☐	☐	☐
e. serial number	☐	☐	☐
f. Type I	☐	☐	☐

	Yes	No	N/A
7. Are the outer surfaces of the secondary tank free of signs of damage (weld breaks, punctures, cracks, corrosion and other structural damage)?	☐	☐	☐
8. If the secondary tank was damaged, was the primary tank inspected for damage?	☐	☐	☐
9. Is one fill assembly provided per primary tank and located in the man-way?	☐	☐	☐
10. Is the fill assembly constructed of schedule 80 PVC and installed properly?	☐	☐	☐
11. Are all edges, where openings are cut into the tanks, trimmed smooth?	☐	☐	☐
12. Is the asphalt surface level?	☐	☐	☐
a. If no, was sand or padding used to provide an even surface on the asphalt for tank placement?	☐	☐	☐
13. Was the existing asphalt surface permanently marked to indicate the proposed location of all tanks?	☐	☐	☐
14. Were manufacturer's instructions for assembly and placement followed without mishap?	☐	☐	☐
15. Following installation is the secondary tank free of weld breaks, punctures, cracks, corrosion and other structural damage?	☐	☐	☐
16. Was a hydrostatic test conducted at the time of installation by filling the tank completely with water and checking for leaks?	☐	☐	☐
17. Are proper warning signs affixed to the tank?	☐	☐	☐
18. Is ancillary equipment supported and protected against physical damage and stress due to settlement, vibration, expansion and contraction?	☐	☐	☐
19. Is leak detection equipment installed (near the bottom, between primary and secondary tanks) and operating properly?	☐	☐	☐
a. If no, will visual inspection of secondary containment be performed daily to detect leaks?	☐	☐	☐
20. Were all fittings installed in accordance with design specifications?	☐	☐	☐
21. Is a 3-inch PVC Vent fitting placed in the center at the top of the primary tank and does it consist of a 3-inch National Pipe Thread (NPT) bulkhead fitting made of PVC?	☐	☐	☐
22. Is a vent system installed and operational?	☐	☐	☐
23. Are tanks permanently housed in tents constructed of a polyester substrate coated with polyvinyl chloride?	☐	☐	☐
24. Are spacers or equivalent installed between the primary and secondary tank?	☐	☐	☐

	Yes	No	N/A
25. Is the tank located at least one foot from the tent fabric?	☐	☐	☐
26. Does the space between the primary and secondary tank allow for visual inspection or the installation of leak detection equipment?	☐	☐	☐
a. Is the space adequate to implement waste removal strategies?	☐	☐	☐
27. Was a polyethylene mesh installed between the bottom surfaces of the primary and secondary tank to allow leak detection between tanks?	☐	☐	☐
28. Is the liquid level float assembly marked to indicate when the level is at the tangent line?	☐	☐	☐

Comments:_____

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APPENDIX D
INITIAL TANK SYSTEM CERTIFICATION

RCRA HAZARDOUS WASTE TANK ASSESSMENT
ROCKY FLATS PLANT
MTS 350370PA3
December 15, 1993

This document is provided for the RCRA hazardous waste tank system described below, as requested in the Statement of Work for the Independent RCRA Certification of the Accelerated Sludge Removal Project, Hazardous Waste Storage Tank System, Revision No. 1. Project # MTS 350370PA3.

This document is a certification of the tank system by an independent, qualified, registered Colorado professional engineer with ERM-Rocky Mountain, Inc., and has been prepared in accordance with the applicable Colorado Hazardous Waste Regulations, 6 CCR 1007-3 Section 265.192, "Design and Installation of New Tank Systems or Components."

This is an initial tank certification which is restricted to the tank and does not include ancillary equipment.

TANK SYSTEM

RCRA NO.	TANK NO.	TENT NO.	SERIAL NO.	TANK NAME
....	....	....	.....	.....

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.
I hereby certify and attest, that the tank system has been examined in accordance with the regulations cited above and is assessed to be of sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. This certification is based on the condition of the tank system at the time of investigation as described in the attached checklist and Initial Tank Certification Report.

_____
Colorado Professional Engineer Signature

_____
Date